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Economic Analysis of Market Definition and Market Power Related to Apple's Mobile App Platform

By

David S. Evans*

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* Chairman, Global Economics Group; Lecturer, University of Chicago Law School; Executive Director, Jevons Institute for Competition Law and Economics, and Visiting Professor, University College London.

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██████████ and other ██████████ providers claim that Apple has engaged in certain anticompetitive business practices. This paper examines the relevant antitrust market for assessing those claims that involve Apple's mobile platform, and whether Apple has significant market power in that relevant antitrust market.¹ My analysis is preliminary and may change as I conduct more economic analyses and consider additional evidence. Based on the evaluation of the available economic evidence, however, I conclude that:

1. the relevant antitrust market for assessing the claims related to ██████████ providers is no broader than the provision of "mobile platform app services" to edge providers and end users of apps; and
2. Apple has significant market power in the mobile platform app services market.²

"Edge providers" are businesses that provide services over the Internet.³

I. Economic and Technical Background

Software platforms provide application programming interfaces (APIs) and software development tools that enable developers to write applications for those platforms and for users to run those applications. Software platforms for computing devices typically enable the developer to use hardware features such as for drawing pixels on the screen.⁴

Edge providers, such as Amazon, deliver services over the Internet to end users that have computing devices, such as PCs or smartphones, which run operating systems, such as the MacOS for PCs or Android for smartphones. Many edge providers operate websites that users

¹ I therefore do not address market definition issues related to ██████████ in the paper.

² The mobile app platform is two-sided and facilitates the interactions among app users and developers.

³ Edge providers have websites and provide content and services accessed by browsers. Some edge providers offer services through software programs that reside on servers that are accessed over the Internet (what is often referred to as the "Cloud").

⁴ Applications run using the computer processor and memory of the device or, in networked environments, the computer processor and memory of a server computer.

can access with the browser on their desktop or laptop computers and with an Internet connection. Some edge providers, however, find that they can offer better and more complex services using apps instead of, or in addition to, operating a website. Dropbox, for example, uses an app in concert with a website.

Until 2008, edge providers that delivered services using apps wrote them primarily for the Windows and MacOS “PC operating systems” for desktops and laptops computers. They obtained software development kits from Microsoft or Apple for a small fee. They then wrote apps that relied on the APIs for those operating systems. They typically distributed those apps on their own websites or, in the early days, through physical media. iTunes, for example, was an app that was available through Apple’s website for Windows and MacOS computers. Edge providers did not require permission, or have to go through any intermediary, to make their apps available to end users. And, of course, edge providers that deliver services through websites did not have to seek permission either.

Starting in 2008, edge providers could provide apps for mobile devices that ran the iOS, Android, or other “mobile operating systems.”⁵ There was an important change, however, in the manner of distribution. Mobile apps were distributed through “app stores” that imposed quality control on the apps available to users and acted as intermediaries between the app developer and app user. Typically, app developers have to submit their apps to the store operator and the store operator decides whether to make it available. Consumers mainly obtained apps through these stores.⁶

⁵ Apps could be written for some mobile operating systems previously but mobile apps did not become economically significant until after the launch of the App Store for the iPhone in July 2008.

⁶ By vetting apps the operators of these app stores can limit negative externalities for the mobile operating system as well as promote positive externalities; this process can also be used for exclusionary purposes. For discussion see, David S. Evans, “The Antitrust Analysis of Rules and Standards for Software Platforms,”

Features of mobile devices and their operating systems led many edge providers to provide services using apps rather than through a browser.⁷ Some edge providers that provided services to PC users through a website accessed through a browser, such as YouTube, decided to also provide apps to mobile users.

II. The Shift from Websites Accessed from PCs to Apps on Smartphones

In the last several years Americans have shifted how they consume online services rapidly and dramatically. They have shifted from PCs to smartphones, and from websites accessed through browsers to apps on smartphones.

Between 2008 and 2015 the proportion of time spent online using mobile devices increased from 12.7 percent to 54.6 percent.⁸ Commerce has moved dramatically from PCs to mobile. Americans made 57 percent of their online purchases from mobile devices in 2014; that was uncommon before 2010.⁹ On Thanksgiving Day, November 26, 2015, around 60 percent of

(November 8, 2014). Competition Policy International, Autumn 2014, Vol. 10, No. 2; University of Chicago Coase-Sandor Institute for Law & Economics Research Paper No. 708. Available at SSRN: <http://ssrn.com/abstract=2520860>.

⁷ It is possible to develop web pages that mobile device users access with a browser and that do not rely on mobile operating system APIs or get distributed through the app stores. When only simple functionality is required these mobile browser-based means of providing services can mimic the experience of a mobile operating system-based app. Priya Viswanathan, "Native Apps vs. Web Apps – What is the Better Choice?" About.com, <http://mobiledevices.about.com/od/additionalresources/a/Native-Apps-Vs-Web-Apps-Which-Is-The-Better-Choice.htm>; Janna Badalian, "HTML5 vs. Native: The Debate is Over," MobileSmith, May 20, 2015, <https://www.mobilesmith.com/html5-vs-native-debate-is-over/>; Peter-Paul Koch, "Web vs. Native: Let's Concede Defeat," May 26, 2015, http://www.quirksmode.org/blog/archives/2015/05/web_vs_native_1.html.

⁸ Source: David Pakman, "May I Have Your Attention, Please?" Medium, August 10, 2015, <https://medium.com/life-learning/may-i-have-your-attention-please-19ef6395b2c3?curator=MediaREDEF#2rwedr27o>. This data is consistent with that from other sources, including Nielsen, "The Total Audience Report: 2015Q2 2015", http://s1.q4cdn.com/199638165/files/doc_presentations/2015/Total-Audience-Report-Q2-2015.pdf; eMarketer, "Mobile Continues to Steal Share of US Adults' Daily Time Spent with Media," April 22, 2014, <http://www.emarketer.com/Article/Mobile-Continues-Steal-Share-of-US-Adults-Daily-Time-Spent-with-Media/1010782>.

⁹ David Murphy, "IBM: Christmas Day Sales Up 8.3 Percent, Mobile Purchases up 20.4 Percent," PC Magazine, December 26, 2014, <http://www.pcmag.com/article2/0,2817,2474217,00.asp>.

US website visits were made from mobile devices.¹⁰ Advertising has moved to mobile in response. Facebook earned 78 percent of its global advertising revenue from mobile in 2015Q3¹¹ compared with 14 percent in 2012Q3.¹² These trends are expected to continue.¹³

On mobile devices, consumers have chosen to access Internet-based services primarily using mobile apps rather than using websites with their mobile browser. Mobile apps accounted for nearly 90 percent of the time Americans spend using mobile apps or browsers on their mobile devices.¹⁴ As the shift from PCs to mobile continues, the share of time spent in mobile apps as a percentage of overall time spent online therefore is only likely to grow.¹⁵

██████ experience, which is typical based on other data I have seen, confirms the shift to mobile apps. ██████, like the other major ██████ providers, has had a mobile app for the leading mobile operating systems. In 2012, of the people who used ██████ for the first time, ██████ did so using a mobile app. That increased to ██████ in 2015.¹⁶ The share of ██████ in the US that have taken place using mobile apps has increased from ██████

¹⁰ Hiroko Tabuchi, "Black Friday Shopping Shifts Online as Stores See Less Foot Traffic," *New York Times*, November 27, 2015, http://www.nytimes.com/2015/11/28/business/black-friday-shopping-shifts-online-as-stores-see-less-foot-traffic.html?_r=0.

¹¹ Facebook Inc., "10-Q for Period Ending September 30, 2015," p. 40.

¹² Facebook Inc., "10-Q for Period Ending September 30, 2012," p. 27.

¹³ Chantal Tode, "M-Commerce Sales to Reach \$142B in 2016: Forrester," *Mobile Commerce Daily*, October 8, 2015, <http://www.mobilecommercedaily.com/mcommerce-sales-to-reach-142b-in-2016-forrester>; Matthew Hobbs, "Internet Advertising," 2015, <http://www.pwc.com/gx/en/industries/entertainment-media/outlook/segment-insights/internet-advertising.html>.

¹⁴ Simon Khalaf, "Seven Years into the Mobile Revolution: Content is King ... Again," *Flurry Insights*, August 26, 2015, <http://flurrymobile.tumblr.com/post/127638842745/seven-years-into-the-mobile-revolution-content-is>; <http://flurrymobile.tumblr.com/post/127638842745/seven-years-into-the-mobile-revolution-content-is>; <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2015/The-2015-US-Mobile-App-Report>.

¹⁵ Total time spent on digital media using mobile apps increased at a compound annual growth rate of 38 percent per year between 2013 and 2015, compared to 7 percent for desktops and 24 percent for mobile browsing. The share for mobile apps increased from 43 percent to 54 percent over this period, an increase of 11 percentage points, or a compound annual growth rate of 12 percent. Data are not available before 2013 for these calculations.

¹⁶ The 2015 figures in this paragraph are based on data through mid-October 2015.

██████ in 2013 to ██████ in 2015. Meanwhile the share of ██████ streams from desktop apps has declined from ██████ in 2013 to ██████ in 2015. It is my understanding that ██████ expects the mobile share to continue to grow and that mobile will become the primary method for ██████.

III. Apple's Mobile Platform

Apple operates a two-sided platform for mobile app services that connects edge providers, who want to develop apps, and mobile device users, who want to use apps to access services over the Internet. The platform consists of three components:

1. The iOS mobile operating system, which provides APIs and a software development environment for mobile apps.
2. The Apple App Store, which provides the exclusive distribution facility for apps on iOS-based devices.
3. The iPhone and iPad, which are physical devices that run iOS and the mobile apps that rely on iOS.

Apple is vertically integrated in the provision of the operating system, the app store, and the hardware.

Edge providers that want to provide a mobile app for Apple mobile users pay an annual program fee to enter into a developer program licensing agreement with Apple to obtain access to the software tools for developing apps.¹⁷ They then submit their apps, in addition to any revisions to those apps, for approval by the Apple App Store. There is no other way for edge

¹⁷ Apple, "iOS Developer Program License Agreement," September 9, 2014, https://developer.apple.com/programs/terms/ios/standard/ios_program_standard_agreement_20140909.pdf.

providers to offer mobile apps for Apple mobile devices than going through the processes put in place by Apple.¹⁸

IV. Market Definition

To analyze the relevant antitrust market we need to consider the alternatives available to the app developers and app users. I offer some informal economic considerations here that I expect would be confirmed by more systematic approaches.

Suppose that a hypothetical monopolist consisting of all mobile platform app service providers—including Apple, Android, and Windows Phone—increased the price by a small but significant non-transitory amount (SSNIP), or reduced the quality by a small but significant non-transitory amount (SSNDQ), of their platforms over the competitive level. Mobile browser use and PC software platforms running on desktops or laptops are not likely to provide competitive constraints on this price increase or quality decrease. To see this, consider the two sides of the hypothetical market.

1. Edge providers. For edge providers that use mobile apps, offering services through mobile browsers is generally significantly less attractive. First, mobile apps can rely on much greater functionality made available by the mobile OS through APIs than is available by providing services on a web page accessed through a mobile browser. Second, the services provided on a mobile app can be superior because the mobile app can use data that are locally

¹⁸ These facts are important for assessing market definition and market power. I am not suggesting that, in and of itself, there is anything anticompetitive about this way of organizing Apple's business. I also note that end users can install applications outside of Apple's App Store if they modify the operating system on their iOS devices. Such modifications are commonly referred to as "jailbreaking." Apple warns users not to do so, noting that "Unauthorized modification of iOS can cause security vulnerabilities, instability, shortened battery life, and other issues" and that "unauthorized modification of iOS is a violation of the iOS end-user software license agreement and because of this, Apple may deny service for an iPhone, iPad, or iPod touch that has installed any unauthorized software." See Apple, "Unauthorized Modification of iOS Can Cause Security Vulnerabilities," available at <https://support.apple.com/en-us/HT201954>. Jailbreaking of iOS devices is uncommon outside of China.

stored on the mobile device, as well as rely on the local processing power of the mobile device. For example, online content providers can cache content that can be displayed more quickly than by retrieving content over the Internet and can be made available for offline use; they can also store content, including music, on the phone to reduce the use of data and improve efficiency. Third, aside from performance and functionality differences, the mobile app store has come to provide an important distribution channel that helps consumers find and discover content and services for their mobile devices; for these same reasons it has become an important promotional vehicle for app providers. Edge providers would therefore be unlikely to switch enough to render a SSNIP or SSNDQ unprofitable to the hypothetical monopolist. Fourth, unlike PC apps, mobile phone apps enable consumers to obtain the services of the app when they are out and about and do not have access to a PC.

2. Consumers. Consumers have moved their consumption of Internet content to mobile devices in large part because these mobile devices are conveniently available all day while fixed devices are not. Therefore, if a hypothetical monopolist imposed a SSNIP or a SSNDQ, consumers would not switch significantly from smartphones to PCs. If they did, consumers would lose access to the apps on mobile phones, the ability to use those apps during parts of the day when they are not near a PC, and the ability to use those apps when they are out and about without access to a PC. (A growing segment of consumers, particularly younger ones, also do not have PCs and rely entirely on their mobile phones.¹⁹) Nor, if there were a SSNDQ that just affected mobile apps, could consumers readily switch to obtaining those services using the mobile browser on their smartphones. For many services they obtain through apps, consumers

¹⁹ See, e.g., Karen McGrane, “The Rise of the Mobile-Only User,” *Harvard Business Review*, May 28, 2013, <https://hbr.org/2013/05/the-rise-of-the-mobile-only-us/>.

cannot obtain the same services as conveniently, if at all, by using their mobile browser to access a website. Therefore, consumers would be unlikely to switch significantly either to PC-based methods of obtaining services, or to mobile-browser based methods of obtaining services, enough to render a SSNIP or SSNDQ unprofitable to the hypothetical monopolist of the mobile app platform.

These considerations indicate, at least informally, that the relevant market for assessing Apple's practices with respect to [REDACTED] providers is no broader than mobile platforms that provide services to app developers and app users.

V. Market Power

To assess whether Apple has significant market power over edge providers that deliver services using mobile apps, I consider Apple's economic significance in the relevant market defined above, show that Apple has significant bargaining leverage over edge providers, and present direct evidence that Apple has significant market power based on [REDACTED] experience.

A. Size and Share Evidence

The economic evidence on Apple's position in the mobile app services market defined above indicates that it has significant market power. In the US, there are approximately 100 million people with Apple iPhones.²⁰ These users accounted for 62.4 percent of minutes spent and 70.7 percent of page views on mobile phones or tablets.²¹ [REDACTED]

[REDACTED] [REDACTED] [REDACTED]

²⁰ Consumer Intelligence Research Partners, "Over 100 Million iPhones in Use in US," November 19, 2015.

²¹ comScore, "Mobile Metrix," April 2015. Excluding tablets, iPhones accounted for 54.8 percent of smartphone minutes and 57.8 percent of smartphone page views.

obtaining distribution through the App Store. They have no economically feasible alternatives for reaching these users.

Mobile browser-based means of providing services are not feasible substitutes for providing [REDACTED] to iPhone users. No [REDACTED] provider that I am aware of has forgone offering a mobile app through Apple's App Store even though doing so would enable them to avoid Apple's 30 percent commission and other restrictions. That fact provides significant economic evidence of Apple's market power over app developers like [REDACTED].

The only other path that [REDACTED] providers have to reach iPhone consumers involves reaching them through desktop apps. That alternative is not feasible for [REDACTED] providers since it is likely that a considerable portion of [REDACTED] takes place in situations in which consumers do not, or could not, have access to desktop computers. As noted above, the preponderance of [REDACTED] for [REDACTED] takes place on mobile devices.

[REDACTED] providers could not credibly threaten to defeat a price increase or quality decrease by withdrawing from Apple's mobile platform. They would not be viable without access to Apple's iPhone and iPad users. For example, [REDACTED], which has the largest number of users among [REDACTED] providers, estimates that [REDACTED] [REDACTED] It follows a freemium model in which it seeks to attract large numbers of users to its money-losing ad-supported free service and then persuades some of them to upgrade to paid service that has greater functionality and no ads. Losing significant portions of the free or paid customers would have serious adverse effects on [REDACTED] business and I expect other [REDACTED] providers are in similar situations. In particular, to have a viable business [REDACTED] must have an app for the iPhone and therefore cannot defeat an exercise of market power by Apple.

C. Direct Evidence of Market Power

The direct economic evidence demonstrates that Apple, in fact, has significant market power over app developers, and is consistent with what I would expect given the data and analysis presented above.

██████████, when faced with significant increases in cost or reductions in quality for its ██████████ service for iPhones, has acceded to Apple's terms and conditions and has not been able to turn to any substitutes that would provide it with bargaining leverage in its dealings with Apple.

Essentially, Apple forced ██████████ to adopt its IAP API under the threat of "being kicked out of the app store". It do so by banning links to ██████████ thereby impairing ██████████ ability to substitute iOS users away from the IAP API to other purchasing channels.²⁴ Even though compliance with Apple's demands would require ██████████ to charge its subscribers a higher price than on its website, to earn the same margin, to provide a lower quality experience for its users, and to forgo the ability to engage in various promotional efforts, ██████████ acceded in order to "maintain [its] biggest acquisition channel."²⁵

The following events, which are illustrative and not comprehensive, confirm that Apple was able to exercise significant market power as a result of its bargaining leverage over ██████████ and ██████████ lack of feasible alternatives for reaching iOS-device users.

- In ██████████, ██████████ removed the account sign-up button from its mobile app after Apple threatened to pull the existing ██████████ app from the app store.²⁶ Apple informed

²⁴ ██████████-VOL-00001250.

²⁵ ██████████-VOL-00001803.

²⁶ ██████████-VOL-00001701; ██████████-VOL-00001714.

██████ that it could not link to or reference its website URL in app.²⁷ ██████ removed the sign up button and references to its website even though doing so would “introduce . . . more friction into the purchasing process,”²⁸ thereby making it less likely that iOS users would create accounts and purchase ██████.

- In ██████, ██████ removed a feature that would allow new users to sign up for a free trial to ██████ after Apple rejected the update as violating the revised Rule 11.13 in its App Store review process.²⁹ ██████ removed the free trial signup feature from its app in order to keep its app in the App Store, even though “[t]rial is critical to ██████ business model.”³⁰
- In ██████, ██████ cancelled the ██████ release of its ██████ app because of App Store rejections due to links to its website that Apple rejected under Rule 11.13, including ██████. ██████ removed these links even though the links could enhance user experience.
- After Apple banned ██████ from attempting to substitute users away to non-iOS payment channels, ██████ began implementing Apple’s IAP API in ██████. ██████ faced further delay in ██████ when Apple insisted on a global launch of IAP, which Apple knew ██████ did not have the ██████ to do.³³ After months of negotiations with Apple, in ██████, Apple finally agreed to allow ██████ to do country-based rollouts where ██████ had the ██████ to do so, but noted that ██████ would need to remove its ██████. ██████ After obtaining proper ██████, ██████ launched IAP in ██████.

²⁷ ██████ -VOL-00001701 at 1702 ██████

²⁸ ██████ -VOL-00001638 at 39.

²⁹ In the App Store rejection notice, Apple stated ██████. See ██████ -VOL-00002330.

³⁰ ██████ -VOL-00002802.

³¹ ██████ -VOL-00002329.

³² ██████ -VOL-00001701; ██████ -VOL-00002394.

³³ ██████ -VOL-00004228.

³⁴ ██████ -VOL-00002132; ██████ -VOL-00001406.

³⁵ ██████ -VOL-00002542.

In each of these incidents, Apple forced [REDACTED] to remove quality-enhancing and output-enhancing, and price-reducing, features from its app under the threat of removing [REDACTED] from the App Store or rejecting [REDACTED] updates. With no efficient alternative distribution channels to reach iOS users, [REDACTED] was forced to abandon each of these consumer-enhancing changes in order to continue to distribute its app to iOS users.

These episodes are consistent with Apple having significant market power over the ability of [REDACTED] providers to distribute their apps to end users, over the terms and conditions of promoting their apps to end users, over the ability of end users to obtain [REDACTED] apps, and over the prices of those apps. These episodes are also consistent with the relevant antitrust market being limited to mobile app software platform service provision since the ability of a hypothetical monopolist over that market to impose a SSNIP or SSNDQ would be at least as great at Apple's with respect to its own platform.

D. Apple's Market Power over Paid Subscriptions

There is one area where one could argue that [REDACTED] providers could try to substitute away from Apple's mobile platform. [REDACTED], and some other [REDACTED] providers, have premium versions of their app for which they charge and free versions of their app, which have less functionality and include ads, for which they do not charge. Apple has imposed various restraints on how they market the paid app and charges a 30 percent commission. Consumers, however, can sign up for [REDACTED] services on the [REDACTED] [REDACTED] service's website and, since the [REDACTED] provider doesn't pay a commission to the App Store, at a lower cost. Moreover, [REDACTED] services can, subject to the restrictions Apple imposes, encourage consumers to sign up for the premium app on their websites rather than through the app. In practice, these methods do not provide viable

alternatives for defeating an exercise of market power by Apple or to counter Apple's bargaining leverage.

██████████ has found that it is not economically or practically feasible, given Apple’s restrictions, to inform consumers that there are less expensive ways to obtain ██████████. The company found that ██████████ of iOS users surveyed were not aware that they could purchase a subscription to ██████████ streaming product at a lower price on ██████████ than through IAP.³⁶ The majority of users noted that if they were aware that ██████████ was available for a cheaper price on ██████████, they would not continue purchasing it through the app.³⁷

██████████ has evaluated various ways to inform these users so that they could sign up on ██████████ rather than through Apple’s IAP process. The company, for example, has email addresses for all of its users. ██████████ has conducted experiments to see whether emails to its users that signed up through IAP would persuade users to shift to paying through ██████████. The company found that this alternative was not effective largely because of the low response rate to such emails.³⁸

The economic evidence reviewed in this section, including the direct evidence concerning Apple's imposition of price and non-price costs on [REDACTED], demonstrates that Apple has significant market power in the provision of mobile app platform services to edge

³⁶ [REDACTED]-VOL-00000110 at 248.

³⁷ *Id.* at 249.

³⁸ [REDACTED] Letter to the FTC re: Apple's Anti-Competitive Practices.

providers. Apple's market power is particularly strong with regard to [REDACTED]
providers.